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EXAMINER

LIU, LI

ART UNIT	PAPER NUMBER
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2613

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/800,371

Applicant(s)

BAI, YU SHENG

Examiner

Li Liu

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 March 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-30 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-30 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 03/12/2004, 04/29/2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received:

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 05/20/2004.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date: _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

DETAILED ACTION

Preliminary Amendment

1. The preliminary amendment has been entered.

Information Disclosure Statement

2. The information disclosure statement (IDS) submitted on 05/20/2004 is being considered by the examiner.

Claim Objections

3. Claim 12 is objected to because of the following informalities:

- 1). Page 20, line 4, "to output the first electrical signal and an electrical signal" should be changed to "to output the first electrical signal and a **second** electrical signal".

- 2). Page 20, line 5, "to receive the electrical signal and output the second data signal" should be changed to "to receive the **second** electrical signal and output the second data signal".

Appropriate correction is required.

Claim Rejections - 35 USC § 112

4. Claims 1, 2, 4-9 and 19-21 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

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Claims 1 and 19 recite "the first optical signal is associated with a signal-to-noise ratio related to the first supervisory signal, the signal-to-noise ratio being larger than or equal to 20 dB". It is not clear whether the signal-to-noise ratio is for the "optical signal" or for the "supervisory signal". According to the original description, the SNR of 20 dB should be for the supervisory signal.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 3, 10, 15-18, 22, 23 and 27-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fee (US 6,108,113) in view of Sahin et al (Sahin et al: "Dispersion Division Multiplexing for In-Band Subcarrier-Header-Based All-Optical Packet Switching", OFC, 2002, paper-WO1, page 279-280).

1). With regard to claim 3, Fee discloses an apparatus (Figure 9) for processing a supervisory signal for optical network applications, the apparatus comprising:

a subcarrier transmission system (900 in Figure 9) configured to receive a first supervisory signal (905 ancillary data) and output a second supervisory signal (modulated signal 910);

an electrical-to-optical conversion system (LD 630 in Figure 9) configured to receive the second supervisory signal and a first data signal (602 data signal) and output a first optical signal (622 modulated optical signal);

an optical-to-electrical conversion system (PD 660 in Figure 9) configured to receive the optical signal and output a first electrical signal;

a subcarrier reception system (the combination of LPF 670 and Demodulator 920 in Figure 9) configured to receive the first electrical signal (the LPF receives the electrical signal output from the PD; Figure 9) and output a third supervisory signal (Demodulator 920 output the recovered ancillary data 925 in Figure 9);

an optical system (the fibers 623 and 632 etc in Figure 9) coupled to the electrical-to-optical conversion system and the optical-to-electrical conversion system;

wherein the second supervisory signal (Modulated signal 910 in Figure 9) is associated with a first subcarrier frequency (1 MHz signal subcarrier, column 11, line 42-55);

wherein the first data signal is associated with a first data bandwidth, the first data bandwidth including a first data frequency, at the first data frequency a power density of the first data signal substantially equal to zero (Figure 8A, the data frequency is F b/s, the data bandwidth is related to F Hz, and at the F Hz the data signal substantially equal to zero);

But, Fee does not disclose that (A) an optical-to-electrical conversion system configured to receive the first optical signal and output a first electrical signal and a

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second data signal; and (B) wherein a ratio of the first subcarrier frequency to the first data frequency ranges from 0.8 to 1.

With regard to item (A), Fee uses a coupler 634 to split the optical first, and then optical-to-electrical conversions are installed after the coupler 634. The PD 660 receives the portion of the optical signal and output a first electrical signal; and most of the optical signal emerges along line 636 and enters the optical switch 640; and finally another PD at the receiver receive the optical signal and output a second data signal.

By using the coupler, the optical signal is split first and then the split optical signals are converted to electrical signals. Although Fee does not specifically disclose the coupler is put after the O/E converter such limitation is merely a matter of design choice and would have been obvious in the system of Fee. Fee teaches that the data signal and supervisory signal are separately processed by two different devices. The limitations in claim 1 do not define a patentably distinct invention over that in Fee since both the invention as a whole and Fee are directed to separate signals. Therefore, to put the coupler in front of the O/E converter or after the O/E converter would have been a matter of obvious design choice to one of ordinary skill in the art.

With regard to item (B), Fee uses a low frequency subcarrier and the ratio of the subcarrier frequency to the data frequency is less than 0.01. However, Sahin et al provides a subcarrier frequency with a ratio of the subcarrier frequency to the data frequency 0.77 (page 279, subcarrier frequency 7.7 GHz, data rate 10 GHz). It was a common practice to have a subcarrier frequency to be much higher than the data bit rate so to reduce the cross-talk between the data signal and the supervisory signal, and

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have a high SNR of the supervisory signal (e.g. > 17 dB). However, the high frequency supervisory signal then needs a data-rate-faster digital circuits, and leads to a huge increase in complexity, power consumptions and cost. Sahin et al teaches a subcarrier with a frequency lower than the data bit-rate so to get a SNR of ~ 17 dB and the system is easily applicable to commercial transmission systems (page 279, Introduction, and page 280 Results and Discussion).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the subcarrier with a frequency just less than the data bit-rate as taught by Sahin et al to the system of Fee so that a high SNR of the supervisory signal can be obtained and also the system is easily applicable to commercial transmission systems.

2). With regard to claim 10, Fee in view of Sahin et al discloses all of the subject matter as applied to claim 3 above. And Fee further discloses wherein the subcarrier transmission system comprises:

a subcarrier modulator (900 Modulated Signal Generator in Figure 9) configured to receive the first supervisory signal;

But, Fee does not disclose a first band pass filter coupled to the subcarrier modulator and configured to output the second supervisory signal.

However, the band pass filter is a widely used an electronic device or circuit to allow signals between two specific frequencies to pass, and discriminate against signals at other frequencies. The function of a band pass filter in a transmitter is to limit the bandwidth of the output signal to the minimum necessary to convey data at the desired

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speed and in the desired form. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a band pass filter to the system of Fee in view of Sahin so that only the necessary bandwidth of the supervisory signal can be output, the cross-talk between the data signal and the supervisory signal can be reduced.

3). With regard to claim 15, Fee discloses a method for processing a supervisory signal for optical network applications, the method comprising:

receiving a first supervisory signal (Figure 9, Modulated Signal Generator 900 receives the supervisory signal 905);

processing information associated with the first supervisory signal (column 11, line 22-32, the supervisory signal modulated on the subcarrier frequency);

outputting a second supervisory signal (the modulated signal 910 is output from the Modulated Signal Generator, Figure 9) based on at least information associated with the first supervisory signal;

receiving the second supervisory signal and a first data signal (Figure 9, signal combiner 606 receives the second supervisory signal and a first data signal, and output to LD 620);

processing information associated with the second supervisory signal and the first data signal (Figure 9, the electrical signal 608 output from combiner 606 directly drives the laser diode 620);

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outputting a first optical signal (Figure 9, the intensity modulated signal 622 which is output from LD 620) based on at least information associated with the second supervisory signal and the first data signal;

receiving the first optical signal (the PD 660 receives a portion of the optical signal);

processing information associated with the first optical signal (PD 660 in Figure 9 converts the optical signal to electrical signal);

outputting a first electrical signal (the PD 660 in Figure 9 outputs the electrical signal);

receiving the first electrical signal (the LPF 670 in Figure 9 receives the electrical signal);

processing information associated with the first electrical signal (the demodulator 920 in Figure 9 demodulates the electrical signal);

outputting a third supervisory signal (the demodulator 920 in Figure 9 output the recovered ancillary data);

wherein the second supervisory signal is associated with a first subcarrier frequency (Figure 9, the supervisory signal is associated with a subcarrier frequency 1MHz);

wherein the first data signal is associated with a first data bandwidth, the first data bandwidth including a first data frequency, at the first data frequency a power density of the first data signal substantially equal to zero (Figure 8A, the data frequency

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is F b/s, the data bandwidth is related to F Hz, and at the F Hz the power density of the data signal substantially equal to zero);

But, Fee does not disclose that (A) an optical-to-electrical conversion system configured to output a first electrical signal and a second data signal based on at least information associated with the first optical signal; and (B) wherein a ratio of the first subcarrier frequency to the first data frequency ranges from 0.8 to 1.

With regard to item (A), Fee uses a coupler 634 to split the optical first, and then optical-to-electrical conversions are installed after the coupler 634. The PD 660 receives the portion of the optical signal and output a first electrical signal; and most of the optical signal emerges along line 636 and enters the optical switch 640; and finally another PD at the receiver receive the optical signal and output a second data signal.

By using the coupler, the optical signal is split first and then the split optical signals are converted to electrical signals. Although Fee does not specifically disclose the coupler is put after the O/E converter such limitation is merely a matter of design choice and would have been obvious in the system of Fee. Fee teaches that the data signal and supervisory signal are separately processed by two different devices. The limitations in claim 15 do not define a patentably distinct invention over that in Fee since both the invention as a whole and Fee are directed to separate signals. Therefore, to put the coupler in front of the O/E converter or after the O/E converter would have been a matter of obvious design choice to one of ordinary skill in the art.

With regard to item (B), Fee uses a low frequency subcarrier and the ratio of the subcarrier frequency to the data frequency is less than 0.01. However, Sahin et al

provides a subcarrier frequency with a ratio of the subcarrier frequency to the data frequency 0.77 (page 279, subcarrier frequency 7.7 GHz, data rate 10 GHz). It was a common practice to have a subcarrier frequency to be much higher than the data bit rate so to reduce the cross-talk between the data signal and the supervisory signal, and have a high SNR of the supervisory signal (e.g. > 17 dB). However, the high frequency supervisory signal then needs a data-rate-faster digital circuits, and leads to a huge increase in complexity, power consumptions and cost. Sahin et al teaches a subcarrier with a frequency lower than the data bit-rate so to get a SNR of ~17 dB and the system is easily applicable to commercial transmission systems (page 279, Introduction, and page 280 Results and Discussion).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the subcarrier with a frequency just less than the data bit-rate as taught by Sahin et al to the system of Fee so that a high SNR of the supervisory signal can be obtained and also the system is easily applicable to commercial transmission systems.

4). With regard to claim 16, Fee in view of Sahin et al discloses all of the subject matter as applied to claim 15 above. And Fee further discloses wherein the first data frequency is a maximum frequency associated with the first data bandwidth (Figure 8A, the data frequency is F b/s, the data bandwidth is associated to F Hz).

5). With regard to claim 17, Fee in view of Sahin et al discloses all of the subject matter as applied to claims 15 and 16 above. And Fee further discloses wherein the first

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data frequency is substantially equal to 2.5 GHz (column 9, line 65, STS-48 digital signal, approx. 2.5 GHz).

But, Fee does not disclose that the first subcarrier frequency is substantially equal to 2.4 GHz.

Fee uses a low frequency subcarrier and the ratio of the subcarrier frequency to the data frequency is less than 0.01. However, Sahin et al provides a subcarrier frequency with a ratio of the subcarrier frequency to the data frequency 0.77 (page 279, subcarrier frequency 7.7 GHz, data rate 10 GHz). It was a common practice to have a subcarrier frequency to be much higher than the data bit rate so to reduce the cross-talk between the data signal and the supervisory signal, and have a high SNR of the supervisory signal (e.g. > 17 dB). However, the high frequency supervisory signal then needs a data-rate-faster digital circuits, and makes the system cost higher. Sahin et al teaches a subcarrier with a frequency lower than the data bit-rate so to get a SNR of ~17 dB and the system is easily applicable to commercial transmission systems (page 279, Introduction, and page 280 Results and Discussion).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the subcarrier with a frequency just less than the data bit-rate as taught by Sahin et al to the system of Fee so that a high SNR of the supervisory signal can be obtained and also the system easily applicable to commercial transmission systems.

6). With regard to claim 18, Fee in view of Sahin et al discloses all of the subject matter as applied to claims 15 -17 above. And Fee further discloses wherein the first

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data signal is associated with a non-return to zero format and a first data rate substantially equal to or smaller than 2.5 gigabits per second (Figuer 8A and 8B, column 9 line 63-65, and column 10 line 60-67).

7). With regard to claim 22, Fee in view of Sahin et al discloses all of the subject matter as applied to claim 15 above. And Fee further discloses wherein the processing information associated with the first supervisory signal comprises: modulating the first supervisory signal (the Modulated Signal Generator 900 in Figure 9);

But Fee does not expressly disclose filtering the modulated first supervisory signal.

However, the combination of Fee and Sahin et al teaches the use of the supervisory signal with a frequency of around the data bit-rate. It is a common practice in the art to use a band pass filter to limit the signal band to reduce the cross-talk. The band pass filter is a widely used electronic device or circuit to allow signals between two specific frequencies to pass, and discriminate against signals at other frequencies. The function of a band pass filter in a transmitter is to limit the bandwidth of the output signal to the minimum necessary to convey data at the desired speed and in the desired form. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a band pass filter to the system of Fee in view of Sahin so that only the necessary bandwidth of the supervisory signal can be output, the cross-talk between the data signal and the supervisory signal can be reduced.

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8). With regard to claim 23, Fee in view of Sahin et al discloses all of the subject matter as applied to claims 15 and 22 above. And Fee further discloses wherein the processing information associated with the first electrical signal comprises:

filtering the first electrical signal (the LPF 670 in Figure 9);

demodulating the filtered first electrical signal (Demodulator 920 in Figure 9).

9). With regard to claim 27, Fee discloses an apparatus for transmitting a supervisory signal for optical network applications, the apparatus comprising:

a subcarrier transmission system (900 in Figure 9) configured to receive a first supervisory signal (905 ancillary data) and output a second supervisory signal (modulated signal 910);

an electrical-to-optical conversion system (LD 630 in Figure 9) configured to receive the second supervisory signal and a first data signal (602 data signal) and output a first optical signal (622 modulated optical signal);

wherein the second supervisory signal (Modulated signal 910 in Figure 9) is associated with a first subcarrier frequency (1 MHz signal subcarrier, column 11, line 42-55);

wherein the first data signal is associated with a first data bandwidth, the first data bandwidth including a first data frequency, at the first data frequency a power density of the first data signal substantially equal to zero (Figure 8A, the data frequency is F b/s, the data bandwidth is related to F Hz, and at the F Hz the data signal substantially equal to zero);

But, Fee does not disclose wherein a ratio of the first subcarrier frequency to the first data frequency ranges from 0.8 to 1.

Fee uses a low frequency subcarrier and the ratio of the subcarrier frequency to the data frequency is less than 0.01. However, Sahin et al provides a subcarrier frequency with a ratio of the subcarrier frequency to the data frequency 0.77 (page 279, subcarrier frequency 7.7 GHz, data rate 10 GHz). It was a common practice to have a subcarrier frequency to be much higher than the data bit rate so to reduce the cross-talk between the data signal and the supervisory signal, and have a high SNR of the supervisory signal (e.g. > 17 dB). However, the high frequency supervisory signal then needs a data-rate-faster digital circuits, and leads to a huge increase in complexity, power consumptions and cost. Sahin et al teaches a subcarrier with a frequency lower than the data bit-rate so to get a SNR of ~17 dB and the system is easily applicable to commercial transmission systems (page 279, Introduction, and page 280 Results and Discussion).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the subcarrier with a frequency just less than the data bit-rate as taught by Sahin et al to the system of Fee so that a high SNR of the supervisory signal can be obtained and also the system is easily applicable to commercial transmission systems.

10). With regard to claim 28, Fee discloses an apparatus for receiving a supervisory signal for optical network applications, the apparatus comprising:

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an optical-to-electrical conversion system (PD 660 in Figure 9) configured to receive a portion of the first optical signal (the signal 638 from the coupler 634 in Figure 9) and output a first electrical signal (662 in Figure 9)

a subcarrier reception system (the combination of LPF 670 and Demodulator 920) configured to receive the first electrical signal (Figure 9, LPF receiver the electrical signal) and output a third supervisory signal (Demodulator 920 outputs the recovered ancillary data);

wherein the second data signal is associated with a first data bandwidth; the first data bandwidth including a maximum data frequency (Figure 8A, the data frequency is F b/s, the data bandwidth is associated to F Hz);

But, in Figure 9, Fee does not expressly disclose: (A) an optical-to-electrical conversion system configured to receive a first optical signal and output a first electrical signal and a second data signal; (B) wherein the subcarrier reception system includes a band pass filter associated with a first subcarrier frequency; and (C) wherein a ratio of the first subcarrier frequency to the maximum data frequency ranges from 0.8 to 1.

With regard to item (A), Fee uses a coupler 634 to split the optical first, and then optical-to-electrical conversions are installed after the coupler 634. The PD 660 receives the portion of the optical signal and output a first electrical signal; and most of the optical signal emerges along line 636 and enters the optical switch 640; and finally another PD at the receiver receive the optical signal and output a second data signal.

By using the coupler, the optical signal is split first and then the split optical signals are converted to electrical signals. Although Fee does not specifically disclose

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the coupler is put after the O/E converter such limitation is merely a matter of design choice and would have been obvious in the system of Fee. Fee teaches that the data signal and supervisory signal are separately processed by two different devices. The limitations in claim 1 do not define a patentably distinct invention over that in Fee since both the invention as a whole and Fee are directed to separate signals. Therefore, to put the coupler in front of the O/E converter or after the O/E converter would have been a matter of obvious design choice to one of ordinary skill in the art.

With regard to item (B), however, the band pass filter is a widely used an electronic device or circuit to allow signals between two specific frequencies to pass, and discriminate against signals at other frequencies. The function of a band pass filter in a receiver is to limit the bandwidth of the output signal to the minimum necessary to convey data in the desired form. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a band pass filter to the system of Fee and Sahin so that only the necessary bandwidth associated with the subcarrier frequency can be output, the cross-talk between the data signal and the supervisory signal can be reduced.

With regard to item (C), Fee uses a low frequency subcarrier and the ratio of the subcarrier frequency to the data frequency is less than 0.01. However, Sahin et al provides a subcarrier frequency with a ratio of the subcarrier frequency to the data frequency 0.77 (page 279, subcarrier frequency 7.7 GHz, data rate 10 GHz). It was a common practice to have a subcarrier frequency to be much higher than the data bit rate so to reduce the cross-talk between the data signal and the supervisory signal, and

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have a high SNR of the supervisory signal (e.g. > 17 dB). However, the high frequency supervisory signal then needs a data-rate-faster digital circuits, and makes the system cost higher. Sahin et al teaches a subcarrier with a frequency lower than the data bit-rate so to get a SNR of ~ 17 dB and the system is easily applicable to commercial transmission systems (page 279, Introduction, and page 280 Results and Discussion).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the subcarrier with a frequency just less than the data bit-rate as taught by Sahin et al to the system of Fee so that a high SNR of the supervisory signal can be obtained and also the system easily applicable to commercial transmission systems.

11). With regard to claim 29, Fee discloses a method for transmitting a supervisory signal for optical network applications, the method comprising:

receiving a first supervisory signal (Figure 9, Modulated Signal Generator 900 receives the supervisory signal 905);

processing information associated with the first supervisory signal (column 11, line 22-32, the supervisory signal modulated on the subcarrier frequency);

outputting a second supervisory signal based on at least information associated with the first supervisory signal (the modulated signal 910 is output from the Modulated Signal Generator, Figure 9);

receiving the second supervisory signal and a first data signal (Figure 9, signal combiner 606 receives the second supervisory signal and a first data signal, and output to LD 620);

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processing information associated with the second supervisory signal and the first data signal (Figure 9, the electrical signal 608 output from 606 directly drives the laser diode 620);

outputting a first optical signal based on at least information associated with the second supervisory signal and the first data signal (the PD 660 in Figure 9 outputs the optical signal);

wherein the second supervisory signal is associated with a first subcarrier frequency (Figure 9, the supervisory signal is associated with a subcarrier frequency 1MHz);

wherein the first data signal is associated with a first data bandwidth, the first data bandwidth including a first data frequency, at the first data frequency a power density of the first data signal substantially equal to zero Figure 8A, the data frequency is F b/s, the data bandwidth is related to F Hz, and at the F Hz the power density of the data signal substantially equal to zero);

But, Fee does not disclose wherein a ratio of the first subcarrier frequency to the first data frequency ranges from 0.8 to 1.

Fee uses a low frequency subcarrier and the ratio of the subcarrier frequency to the data frequency is less than 0.01. However, Sahin et al provides a subcarrier frequency with a ratio of the subcarrier frequency to the data frequency 0.77 (page 279, subcarrier frequency 7.7 GHz, data rate 10 GHz). It was a common practice to have a subcarrier frequency to be much higher than the data bit rate so to reduce the cross-talk between the data signal and the supervisory signal, and have a high SNR of the

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supervisory signal (e.g. > 17 dB). However, the high frequency supervisory signal then needs a data-rate-faster digital circuits, and leads to a huge increase in complexity, power consumptions and cost. Sahin et al teaches a subcarrier with a frequency lower than the data bit-rate so to get a SNR of ~ 17 dB and the system is easily applicable to commercial transmission systems (page 279, Introduction, and page 280 Results and Discussion).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the subcarrier with a frequency just less than the data bit-rate as taught by Sahin et al to the system of Fee so that a high SNR of the supervisory signal can be obtained and also the system is easily applicable to commercial transmission systems.

12). With regard to claim 30, Fee discloses a method for receiving a supervisory signal for optical network applications, the method comprising:

receiving a first optical signal (The coupler 634 receives the first optical signal, Figure 9, and PD 660 receive portion of the optical signal);

processing information associated with the first optical signal (the coupler splits the optical signal into two part, on part goes to PD 660, and another part goes to device 640; PD 660 in Figure 9 converts the optical signal to electrical signal);

outputting a first electrical signal (the PD output the electrical signal 662, Figure 9).

receiving the first electrical signal (LPF 660 receives the electrical signal);

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processing information associated with the first electrical signal (the demodulator 920 in Figure 9 demodulates the electrical signal);

outputting a third supervisory signal (the demodulator 920 in Figure 9 output the recovered ancillary data);

wherein the processing information associated with the first electrical signal includes filtering the first electrical signal (LPF 670 in Figure 9 filters the electrical signal);

wherein the filtering the first electrical signal is associated with a first subcarrier frequency (column 5 line 49-52);

wherein the second data signal is associated with a first data bandwidth, the first data bandwidth including a maximum data frequency (Figure 8A, the data frequency is F b/s, the data bandwidth is associated to F Hz);

But, in Figure 9, Fee does not expressly disclose: (A) the O/E outputting a first electrical signal and a second data signal based on at least information associated with the first optical signal; (B) wherein a ratio of the first subcarrier frequency to the maximum data frequency ranges from 0.8 to 1.

With regard to item (A), Fee uses a coupler 634 to split the optical first, and then optical-to-electrical conversions are installed after the coupler 634. The PD 660 receives the portion of the optical signal and output a first electrical signal; and most of the optical signal emerges along line 636 and enters the optical switch 640; and finally another PD at the receiver receive the optical signal and output a second data signal.

By using the coupler, the optical signal is split first and then the split optical signals are converted to electrical signals. Although Fee does not specifically disclose the coupler is put after the O/E converter such limitation is merely a matter of design choice and would have been obvious in the system of Fee. Fee teaches that the data signal and supervisory signal are separately processed by two different devices. The limitations in claim 15 do not define a patentably distinct invention over that in Fee since both the invention as a whole and Fee are directed to separate signals. Therefore, to put the coupler in front of the O/E converter or after the O/E converter would have been a matter of obvious design choice to one of ordinary skill in the art.

With regard to item (B), Fee uses a low frequency subcarrier and the ratio of the subcarrier frequency to the data frequency is less than 0.01. However, Sahin et al provides a subcarrier frequency with a ratio of the subcarrier frequency to the data frequency 0.77 (page 279, subcarrier frequency 7.7 GHz, data rate 10 GHz). It was a common practice to have a subcarrier frequency to be much higher than the data bit rate so to reduce the cross-talk between the data signal and the supervisory signal, and have a high SNR of the supervisory signal (e.g. > 17 dB). However, the high frequency supervisory signal then needs a data-rate-faster digital circuits, and leads to a huge increase in complexity, power consumptions and cost. Sahin et al teaches a subcarrier with a frequency lower than the data bit-rate so to get a SNR of ~17 dB and the system is easily applicable to commercial transmission systems (page 279, Introduction, and page 280 Results and Discussion).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the subcarrier with a frequency just less than the data bit-rate as taught by Sahin et al to the system of Fee so that a high SNR of the supervisory signal can be obtained and also the system is easily applicable to commercial transmission systems.

7. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fee (US 6,108,113) and Sahin et al (Sahin et al: "Dispersion Division Multiplexing for In-Band Subcarrier-Header-Based All-Optical Packet Switching", OFC, 2002, paper WO1, page 279-280) as applied to claims 3 and 10 above, and in further view of Cerisola et al (Cerisola et al: "CORD – a WDM Optical Network: Control Mechanism Using Subcarrier Multiplexing and Novel Synchronization Solutions", IEEE Conference on Communications, 1995, Seattle, WA, June. 1995, pp. 261-255).

Fee in view of Sahin et al discloses all of the subject matter as applied to claims 3 and 10 above. And Fee further discloses wherein the subcarrier reception system comprises: a filter (LPF 670 in Figure 9) configured to receive the first electrical signal (the output 662 from PD 660 in Figure 9); a subcarrier demodulator (Demodulator 920 in Figure 9) coupled to the second band pass filter and configured to output the third supervisory signal (Recovered Ancillary Data 925); wherein the third supervisory signal is substantially the same as the first supervisory signal (ancillary data is recovered, column 11 line 22-32).

But, in Fee's system a low pass filter LPF tuned to the sub-carrier modulation signal is used to receive the electrical signal from PD. Fee does not teach the band pass filter.

However, when a subcarrier with a frequency of 0.8 – 1.0 of the data bit-rate is used in the system of Fee in view of Sahin, a band pass filter must be used to extract the subcarrier so to get the supervisory information. The pass band filter has been widely used in the receiver to recover the supervisory signals, Cerisola et al uses such band pass filter to filter out the subcarrier and remove the cross-talk between the data signal and the supervisory signal (Figure 5, page 262-263, Transmitter Subsystem and Receiver Subsystem).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a band pass filter at receiver as widely used in the art to the system of Fee in view of Sahin so that only the necessary bandwidth of the supervisory signal can be obtained, the cross-talk between the data signal and the supervisory signal can be reduced, and SNR of the supervisory signal can be improved.

8. Claims 12-14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fee (US 6,108,113) and Sahin et al (Sahin et al: "Dispersion Division Multiplexing for In-Band Subcarrier-Header-Based All-Optical Packet Switching", OFC, 2002, paper WO1, page 279-280) and Cerisola et al (Cerisola et al: "CORD – a WDM Optical Network: Control Mechanism Using Subcarrier Multiplexing and Novel Synchronization Solutions", IEEE Conference on Communications, 1995, Seattle, WA, June. 1995, pp.

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261-255) as applied to claim 3, 10 and 11 above, and in further view of applicant admitted prior art (AAPA, Figures 1 and 3).

1). With regard to claim 12, Fee and Sahin et al and Cerisola et al discloses all of the subject matter as applied to claims 3, 10 and 11 above.

But Fee does not disclose wherein the optical-to-electrical conversion system comprises: (A) an optical-to-electrical signal converter configured to receive the first optical signal and configured to output the first electrical signal and an second electrical signal; (B) a clock and recovery system configured to receive the electrical signal and output the second data signal; (C) wherein the second data signal is substantially the same as the first data signal.

With regard to item (A), Fee uses a coupler 634 to split the optical first, and then optical-to-electrical conversions are installed after the coupler 634. The PD 660 receives the portion of the optical signal and output a first electrical signal; and most of the optical signal emerges along line 636 and enters the optical switch 640; and finally another PD at the receiver receive the optical signal and output a second data signal. By using the coupler, the optical signal is split first and then the split optical signals are converted to electrical signals. Although Fee does not specifically disclose the coupler is put after the O/E converter such limitation is merely a matter of design choice and would have been obvious in the system of Fee. Fee teaches that the data signal and supervisory signal are separately processed by two different devices. The limitations in claim 12 do not define a patentably distinct invention over that in Fee since both the invention as a whole and Fee are directed to separate signals. Therefore, to put the

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coupler in front of the O/E converter or after the O/E converter would have been a matter of obvious design choice to one of ordinary skill in the art.

With regard to item (B) and (C), it is a common practice to use a clock/data recovery system at the optical receiver to recover the data signal. AAPA discloses a clock and data recovery system (124 in Figure 1, and 324 in Figure 3). As admitted by applicant, "[a]t the receiver system 120, the optical signal 142 is converted to an electrical signal 144, which often contains signal distortions. These signal distortions are reduced by the clock and data recovery system 124. The clock and data recovery system 124 generates a data signal 146, which is substantially a replica of the data signal 140".

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the clock/date recovery system as widely used in the art to the system of Fee and Sahin so that the signal distortions can be reduced, the input data signal can be recovered and the transmission quality can be improved.

2). With regard to claim 13, Fee and Sahin et al and Cerisola et al and AAPA discloses all of the subject matter as applied to claims 3, 10 and 12 above. Fee further discloses the electrical-to-optical conversion system comprises: a laser source (606 in Figure 9) configured to receive the second supervisory signal (611 in Figure 9) and the first data signal (602 in Figure 9) and output the first optical signal (intensity modulated optical signal 622 in Figure 9);

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But, in Figure 9, Fee shows the electrical data signal directly modulate the LD; and Figure 9 not show an electrical-to-optical modulator coupled to the laser source and configured to receive at least the first data signal and output the first optical signal.

However, as Fee disclose that "[i]n general, any type of high data rate modulated optical source can be used, such as an integrated-type of direct modulated laser or an externally modulated laser, depending upon the required performance, cost, and other known design considerations". The limitations in claim 1 do not define a patentably distinct invention over that as shown in Figure 9 of Fee since both the invention as a whole and Fee are directed to get the modulated data signal. Therefore, to drive the laser diode directly by the high data signal or use an external electrical-to-optical modulator to modulate the optical signal would have been a matter of obvious design choice to one of ordinary skill in the art.

3). With regard to claim 14, Fee and Sahin et al and Cerisola et al and AAPA et al discloses all of the subject matter as applied to claims 3 and 10-13 above. Fee further discloses wherein the electrical-to-optical conversion system comprises an electrical-to-optical signal converter (LD 620 in Figure 9) configured to receive the second supervisory signal (611 in Figure 9) and the first data signal (602 in Figure 9) and output the first optical signal (intensity modulated optical signal 622 in Figure 9).

9. Claims 24-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fee (US 6,108,113) and Sahin et al (Sahin et al: "Dispersion Division Multiplexing for In-Band Subcarrier-Header-Based All-Optical Packet Switching", OFC, 2002, paper WO1,

page 279-280) as applied to claims 15, 22 and 23, and in further view of applicant admitted prior art (AAPA, Figures 1 and 3).

1). With regard to claim 24, Fee in view of Sahin et al discloses all of the subject matter as applied to claims 15 and 22 above. But Fee in view of Sahin et al does not expressly disclose wherein the processing information associated with the first optical signal comprises: converting the first optical signal to an electrical signal and reducing signal distortion associated with the electrical signal.

However, AAPA discloses that an O/E converter (122 in Figure 1 or 322 in Figure 3) is used to convert the optical signal to electrical signal and a clock and data recovery system (124 in Figure 1 or 324 in Figure 3) is used to reduce the signal distortion and recover the signal (page 7, [0029]). As admitted by applicant, "[a]t the receiver system 120, the optical signal 142 is converted to an electrical signal 144, which often contains signal distortions. These signal distortions are reduced by the clock and data recovery system 124. The clock and data recovery system 124 generates a data signal 146, which is substantially a replica of the data signal 140".

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the clock/date recovery system as widely used in the art to the system of Fee and Sahin so that the signal distortions can be reduced, the input data signal can be recovered and the transmission quality can be improved.

2). With regard to claim 25, Fee and Sahin et al and AAPA disclose all of the subject matter as applied to claims 15 and 22-24 above. Fee further discloses wherein the processing information associated with the second supervisory signal and the first

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data signal comprises: converting the second supervisory signal and the first data signal into the first optical signal (Figure 9, LD 620 is configured to receive the combination 608 of the supervisory signal 611 and the first data signal 602, and output the intensity modulated optical signal 622).

But, in Figure 9, Fee does not show “generating a laser signal in response to at least the second supervisory signal; modulating the laser signal with the first data signal; converting the modulated laser signal to the first optical signal”.

However, as Fee disclose that “[i]n general, any type of high data rate modulated optical source can be used, such as an integrated-type of direct modulated laser or an **externally** modulated laser, depending upon the required performance, cost, and other known design considerations”. The limitations in claim 24 do not define a patentably distinct invention over that as shown in Figure 9 of Fee since both the invention as a whole and Fee are directed to get the modulated data signal. Therefore, to drive the laser diode directly by the high data signal or use an external electrical-to-optical modulator to modulate the optical signal would have been a matter of obvious design choice to one of ordinary skill in the art.

3). With regard to claim 26, Fee and Sahin et al and AAPA disclose all of the subject matter as applied to claims 15 and 22-25 above. Fee further discloses wherein the processing information associated with the second supervisory signal and the first data signal comprises converting the second supervisory signal and the first data signal into the first optical signal (Figure 9, LD 620 is configured to receive the combination

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608 of the supervisory signal 611 and the first data signal 602, and output the intensity modulated optical signal 622).

Allowable Subject Matter

10. Claims 1, 2, 4-9 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action.

11. Claims 20 and 21 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

Conclusion

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Hooijmans et al (US 5,390,185) discloses a transmission system for a combination of a main signal and an auxiliary signal.

Jayakumar (US 2003/0025957) discloses a method for multiplexing subcarrier which is modulated with the control, management etc information.

Park et al (Park: " Self-Routing of Wavelength Packets Using an All-Optical Wavelength Shifter and QPSK Subcarrier Routing Control Headers", IEEE Photonics Technology Letters, Vol. 8, NO. 7, July 1996, page 938-940) discloses a subcarrier which is just above the data frequency.

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13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Li Liu whose telephone number is (571)270-1084. The examiner can normally be reached on Mon-Fri, 8:00 am - 5:30 pm, alternating Fri off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ken Vanderpuye can be reached on (571)272-3078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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